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EXAMINER

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Please find below and/or attached an Office communication concerning this application or proceeding.



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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/376,063
Filing Date: August 17, 1999
Appellant(s): ANDOH, SEIJI

MAILED

JUL 15 2004

GROUP 2800

Phillip G. Avruch (Reg. No. 46,076)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 06/09/2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences, which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims in groups: (I) - 20, 22, 24-25; (II) - 26-27; and (III) - 28-29, 31 stand together in groups but do not stand or fall together as groups, and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,462,261

Bond et al

6-1997

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 20, 22, 24-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bond et al.

Bond et al teach a semiconductor device 8, figs 1-6, comprising: a substrate 14 having a main surface and a back surface, wherein said back surface has a central area, a distinct intermediate area surrounding said central area and a peripheral area surrounding said intermediate area; a semiconductor chip 10 formed on said main surface; two distinct groups of separate solder bumps 18: one in the signal, peripheral area and another in the heat transferring, central area, wherein an embodiment drawn in Fig.2 clearly shows a first bump unit located in the distinct area beneath a thermally conductive slag 12 in said central

area of said back surface, wherein said first bump unit radiates heat from said semiconductor device, said central bumps 18 disposed within a first distance between them, sufficiently close (touching each other), so that upon applying heat they are would be inherently capable to melt together. Bond et al teach furthermore a second, signal transmitting bump unit formed of solder bumps 18, Fig.2, located in the peripheral area of the back surface distinctly apart from the central unit of bumps 18 and at a second distance apart from each other, wherein said second bump unit is greater in quantity of solder bumps that the first, central bump unit, said solder bumps are spherical in shape. Regarding to the statement that the second distance is greater than the first distance and the second distance is less than a width of the intermediate area (claims 20, 22, 24-29); and to the statement that the first distance being about 1 to 1.4 times the diameter of the bumps of the first bump unit, and the second distance being about 1.6 to 1.7 times the diameter of the bumps of the second bump unit (claim 31): Since, as it was shown above, appellant claimed device having substantially similar structure and functions as the device disclosed in the prior art, it would have been obvious to one skilled in the art at the time invention was made to employ the second distance being less than a width of the intermediate area, and to make the first distance about 1 to 1.4 times the diameter of the bumps of the first bump unit, and the second distance about 1.6 to 1.7 times the diameter of the bumps of the second bump in the device by Bond et al in order to decrease possibilities of shortening of signal solder bumps, since such a modification would have involved a mere change in the sizes of the components or

a mere change in the ranges of the distances between them. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). Establishing of such workable ranges would also have been obvious to one having ordinary skill in the art at the time the invention was made, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Applicant has not shown that these particular sizes or ranges of sizes are critical by showing that the claimed range achieves unexpected results relative to the prior art range. (*In re Woodruff*, 919 F. 2d 1575, 16 USPQ2d 1934, Fed. Cir. 1990). To establish unexpected results over a claimed range, applicant should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. (*In re Hill*, 128 USPQ 197 CCPA 1960).

(11) Response to Argument

Regarding the statement that examiner has failed to establish a Prima Facie Case: First: Appellant claims a semiconductor device having a plurality of separate solder bumps grouped distinctly in the signal peripheral area and in the heat transferring central area. It is important to note that appellant does not claim a unitary heat transferring body made of the group of solder bumps in the heat transfer area as a part of the claimed structure. Instead the solder bumps in the heat transfer area are claimed as being placed close enough to be melted together upon application of a heat treatment. As it was written in the previous office actions, none of the other important for this technological process

information, such as: sizes of the solder bumps, type of the solder, temperature and longevity of the heat treatment has not been claimed or explained in the specification. Second: Bond et al teach a semiconductor device 8, Figs 1-6, also having two distinct groups of separate solder bumps 18: one in the signal, peripheral area and another in the heat transferring, central area. In discussing figures of the Bond et al reference (page 10, lines 1-5) appellant omitted Fig.2, which clearly shows solder balls 18 located in the central, heat transfer area without any distance between them, which makes it obvious enough to conclude that upon applying heat they would definitely melt together. On the same Fig.2 signal solder bumps are shown located distinctly apart from the central group of bumps. Third: Based on the above examiner disagrees with appellants statement that: "The difference between the claimed invention and the reference by Bond et al is not a matter of degree, but rather one of kind". On the contrary, both devices are substantially similar semiconductor packages having the similar packaging, electronic and cooling design, wherein the difference is not even a matter of degree, but a fact that Bond et al do not claim certain relationships between distances between groups of solder balls and the solder balls themselves. However, by analyzing Fig.2, of the Bond et al reference, considering that a technology of solder balls (bumps) connections to avoid a shorting between them during a reflow (heat applying) process by manipulating sizes of the balls and/or the distances between them is well known in the art, it would be obvious to conclude that in the device by Bond et al an opposite result (melting them together) could also be achieved by manipulating sizes of the heat transmitting

solder balls and/or the distances between them. From examiners point of view that is exactly what was done by Bond et al in order to prevent signal solder bumps from shortening between themselves and with heat transfer solder bumps.

Regarding the statement that the applied references fail to suggest the claimed invention: First: There is only one reference – Bond et al, which was analyzed above as being substantially similar to the claimed device. Second: Appellant admitted in the previous communication that: "...in this case, a person of ordinary skill in the art could readily determine what spacing, or range of spacings, of the bumps in the first bump unit would be sufficiently close such that the bumps would fuse into a unitary body upon application of the heat treatment". Third: Contrary to the appellant arguments, the embodiment shown by Bond et al on Fig.2, no matter how different it is to all other teaching by Bond et al mentioned by the appellant, clearly suggests a structure very close to the one claimed in the instant application. Therefore, examiner concludes: First: Semiconductor device by Bond et al has enough similarities with the claimed semiconductor device to consider the reference by Bond et al suggesting all basic structural elements of the claimed invention combined in the similar way and having the same functions and qualities. Second: Thermal solder bumps shown on Fig.2 by Bond et al would melt in a unitary body when applying a heat in a process of mounting the semiconductor package on a circuit board. Third: It would be obvious to one skilled in the art at the time invention was made to modify distances between groups of the signal and thermal solder bumps and

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between the signal solder bumps in the device by Bond et al in order to decrease possibilities of shortening of signal solder bumps. For the above reasons, it is believed that the rejection should be sustained.

Respectfully submitted,

Primary Examiner

Michael Datskovsky



July 6, 2004.

Conferees:

Darren Schuberg, SPE



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